

**In the Claims**

The following Listing of Claims replaces all prior versions in the application:

**LISTING OF CLAIMS**

1 - 35. (Canceled)

36. (Original) A pFET synapse transistor, comprising:
- a p- doped substrate;
  - a first n- well and a second n- well disposed in said substrate;
  - a first p+ doped region disposed in said first n- well forming a source and a second p+ doped region disposed in said first n- well forming a drain;
  - a channel disposed in said first n- well between said source and said drain;
  - a third p+ doped region and a fourth p+ doped region disposed in said second n- well, said third p+ region and said fourth p+ region together forming a tunneling junction;
  - a layer of gate oxide disposed above said channel, said first n- well and said second n- well;
  - a polysilicon floating gate disposed above said layer of gate oxide;
  - a source contact terminal electrically coupled to said source;
  - a drain contact terminal electrically coupled to said drain; and
  - a well contact terminal electrically coupled to said second n- well.
37. (Original) A pFET synapse transistor in accordance with claim 36, wherein said third

p+ doped region and said fourth p+ doped region are shorted together with a conductive layer which forms a bridge over said floating gate.

38. (Original) A pFET synapse transistor in accordance with claim 37, wherein said well contact terminal is strapped to said third p+ doped region and said fourth p+ doped region.

39. (Original) A pFET synapse transistor in accordance with claim 38, wherein said transistor is formed with a single layer of conductive polysilicon.

40. (Original) A pFET synapse transistor in accordance with claim 36 fabricated using a standard CMOS process.

41-43. (Canceled)

44. (New) A pFET synapse transistor, comprising:

- a p- doped substrate;
- a first n- well and a second n- well disposed in said substrate;
- a first p+ doped region disposed in said first n- well forming a source and a second p+ doped region disposed in said first n- well forming a drain;
- a channel disposed in said first n- well between said source and said drain;
- a third p+ doped region and a fourth p+ doped region disposed in said second n- well, said third p+ region and said fourth p+ region together forming a tunneling junction;
- a layer of gate oxide disposed above said channel, said first n- well and said second n- well;

a polysilicon floating gate disposed above said layer of gate oxide;  
a source contact terminal electrically coupled to said source;  
a drain contact terminal electrically coupled to said drain; and  
a well contact terminal electrically coupled to said second n- well,  
wherein said synapse transistor is configured to operate as a current source without gate input using a single polysilicon gate layer.

45. (New) A system on a chip (SOC) including digital and analog circuits integrated on a single semiconductor chip, the system comprising:

a pFET synapse transistor including:

a p- doped substrate;  
a first n- well and a second n- well disposed in said substrate;  
a first p+ doped region disposed in said first n- well forming a source and a second p+ doped region disposed in said first n- well forming a drain;  
a channel disposed in said first n- well between said source and said drain;  
a third p+ doped region and a fourth p+ doped region disposed in said second n- well, said third p+ region and said fourth p+ region together forming a tunneling junction;  
a layer of gate oxide disposed above said channel, said first n- well and said second n- well;  
a polysilicon floating gate disposed above said layer of gate oxide;  
a source contact terminal electrically coupled to said source;  
a drain contact terminal electrically coupled to said drain; and  
a well contact terminal electrically coupled to said second n- well.

46. (New) A p-channel floating-gate device, comprising:
- a p- doped substrate;
  - a first n- well and a second n- well disposed in said substrate;
  - a first p+ doped region disposed in said first n- well forming a source and a second p+ doped region disposed in said first n- well forming a drain;
  - a channel disposed in said first n- well between said source and said drain;
  - a third p+ doped region and a fourth p+ doped region disposed in said second n- well, said third p+ region and said fourth p+ region together forming a tunneling junction;
  - a layer of gate oxide disposed above said channel, said first n- well and said second n- well;
  - a single polysilicon layer disposed above said layer of gate oxide, said single polysilicon layer comprising a floating gate;
  - a source contact terminal electrically coupled to said source;
  - a drain contact terminal electrically coupled to said drain; and
  - a well contact terminal electrically coupled to said second n- well.
47. (New) A system on a chip (SOC) including digital and analog circuits integrated on a single semiconductor chip, the system comprising:
- a p-channel floating-gate device, including:
    - a p- doped substrate;
    - a first n- well and a second n- well disposed in said substrate;
    - a first p+ doped region disposed in said first n- well forming a source and a second p+ doped region disposed in said first n- well forming a drain;
    - a channel disposed in said first n- well between said source and said drain;

a third p+ doped region and a fourth p+ doped region disposed in said second n- well, said third p+ region and said fourth p+ region together forming a tunneling junction;

a layer of gate oxide disposed above said channel, said first n- well and said second n- well;

a single polysilicon layer disposed above said layer of gate oxide, said single polysilicon layer comprising a floating gate;

a source contact terminal electrically coupled to said source;

a drain contact terminal electrically coupled to said drain; and

a well contact terminal electrically coupled to said second n- well.

48. (New) A p-channel floating gate device comprising:

a p- doped substrate;

a first n- well and a second n- well disposed in said substrate;

a first p+ doped region disposed in said first n- well forming a source and a second p+ doped region disposed in said first n- well forming a drain;

a channel disposed in said first n- well between said source and said drain;

a third p+ doped region and a fourth p+ doped region disposed in said second n- well, said third p+ region and said fourth p+ region together forming a tunneling junction;

a layer of gate oxide disposed above said channel, said first n- well and said second n- well;

a polysilicon floating gate disposed above said layer of gate oxide;

a source contact terminal electrically coupled to said source;

a drain contact terminal electrically coupled to said drain; and

a well contact terminal electrically coupled to said second n- well.

49. (New) A p-channel floating gate device in accordance with claim 48, wherein said third p+ doped region and said fourth p+ doped region are shorted together with a conductive layer which forms a bridge over said floating gate.

50. (New) A p-channel floating gate device in accordance with claim 49, wherein said well contact terminal is strapped to said third p+ doped region and said fourth p+ doped region.

51. (New) A p-channel floating gate device in accordance with claim 50, wherein said transistor is formed with a single layer of conductive polysilicon.

52. (New) A p-channel floating gate device in accordance with claim 48 fabricated using a standard CMOS process.